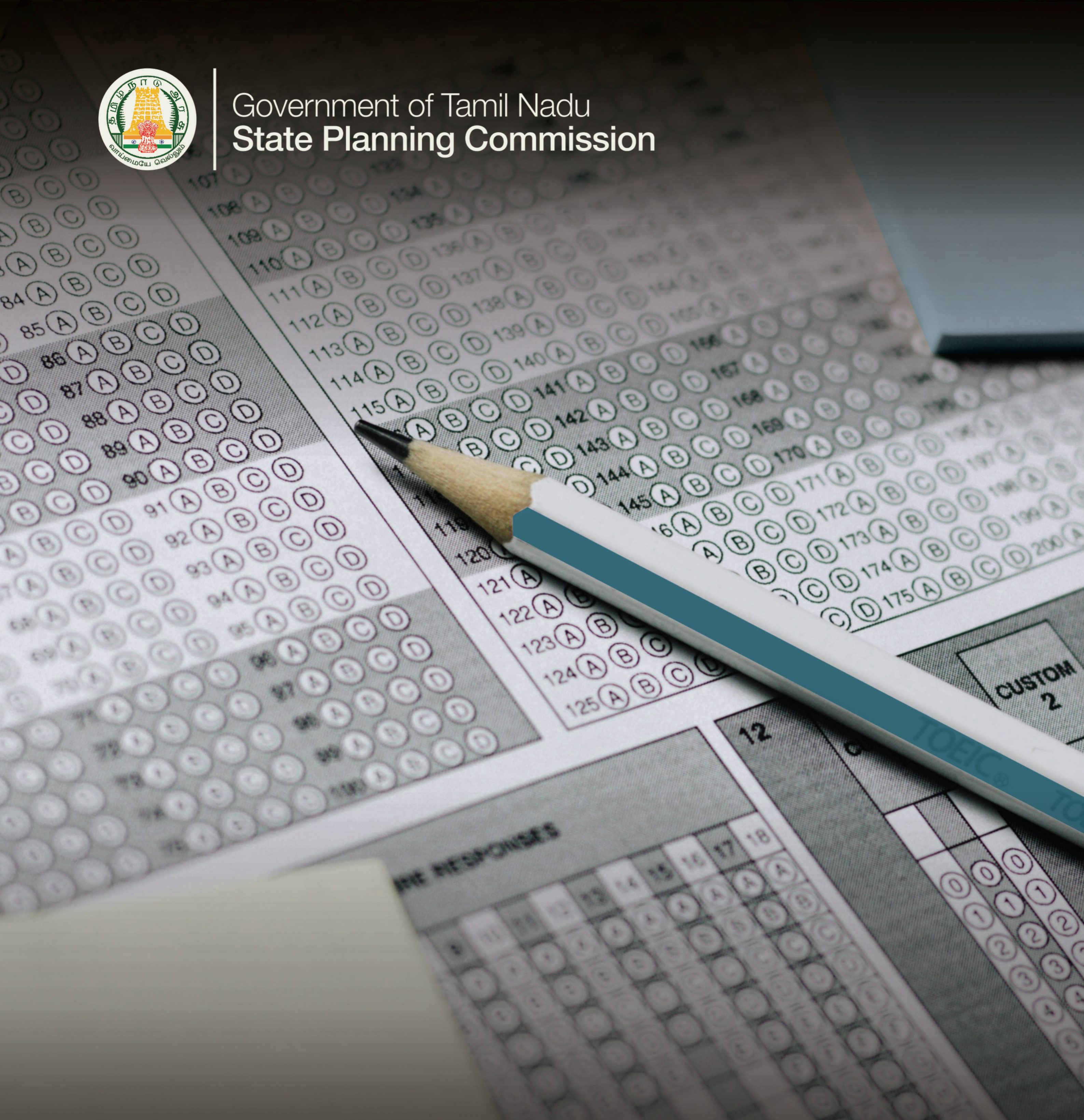
Government of Tamil Nadu
State Planning Commission



REPORT

2023 - 2024

Evaluation of Semester-End Question Papers of

State Universities in Tamil Nadu

[ARTS, SCIENCE AND ENGINEERING COLLEGES]

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Arts, Science and Engineering Colleges

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State Planning Commission
Government of Tamil Nadu

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Foreword

> *"If you want to change a nation, you must change its system of education."*

Education is a priceless investment for the development of a nation. Tamil Nadu has an illustrious history of education. The Dravidian model of development in the State is committed to provide education for all and ensure the transformation of society where everyone has a stake in development. We have succeeded in reaching a very high gross enrolment ratio in higher education, in fact the highest in the country. However, there are significant gaps in the educational outcomes in higher education in our State. This prompted the State Planning Commission to take up an evaluation of the quality of higher education through an assessment of the quality of University question papers.

As recommended by the respective governing bodies for Arts and Science (UGC) and Engineering (AICTE), an ideal question paper has to assess the six cognitive components of learning identified by Bloom's modified Taxonomy. The marks earned by a student should therefore reflect his/her competencies in a particular discipline. The present report analyses sample question papers of select universities in relation to that mandated by UGC & AICTE. Findings of such an analysis underscore a pressing need to restructure our evaluation methods to ensure that degrees obtained actually reflect the competencies to be expected from those who have acquired such degrees.

The State Planning Commission hopes that our universities take note of the findings of this report and promptly initiate course corrections and help our society transform into a "Knowledge Society". This in turn will accelerate the pace of our journey to reach the dream of a trillion dollar economy.

Dr. J. Jeyaranjan
Vice-Chairman
State Planning Commission

Acknowledgement

We sincerely acknowledge the significant contribution of the two partner institutions, who are working as mentors to other institutions to improve the standards of evaluation, **Ayya Nadar Janaki Ammal College (ANJAC),** Sivakasi to aid the evaluation process for arts and science course examinations and **Bannari Institute of Technology (BIT),** Sathyamangalam, Erode for evaluation of engineering course examinations.

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& Controller of Examinations Professor, Dr. T. Rameshkumar, IQAC Coordinator, Professor, Dr. K.L. Senthilkumar, Head-Academics Professor, Dr. Bharanikumar, Head-Skill Development, Professor, Dr. J. Deepika, Assistant Professor Level III, Mr. V.Praveen, Assistant Professor Level II, Dr. P. Sathishkumar, Assistant Professor Level III, Ms. S.S. Nandhini, Assistant Professor Level III & Head, Dr. V. Punitha, Assistant Professor Level II, Dr. S. Selvi, Assistant Professor Level II, Dr. D. Saranya, Assistant Professor Level II, Dr. S. Arulmani, Assistant Professor Level-I, Dr. K. Vanitha, Assistant Professor Level I, Dr. P. Caroline Cynthia, Assistant Professor Level I & Head, Dr. S. Murugappan, Professor & Head, School of Management Studies, Ms. S. Pousia, Assistant Professor Level I, Ms. N.P. Gopika, Assistant Professor Level I, Ms. M. Vaishnavi, Assistant Professor Level I, Ms. P. Annathi, Assistant Professor Level I, Mrs. N.Saranya, Assistant Professor Level II, Mr. S. Saravanan, Assistant Professor Level I, Ms. A. Kothai, Assistant Professor Level I, Dr. S. Sudhahar, Assistant Professor Level III, Dr. M.K.S. Pavithra, Assistant Professor Level III, from BIT and Prof. R. Jaganathan, Associate Professor and Head, Dr. N. Senthil Kumar, Associate Professor and Head, Dr. S. Ganesan, Associate Professor, Dr. M. Selvakumar, Associate Professor, Dr. A. Arulsankar, Associate Professor and Head, Dr. T. Sugumaran, Associate Professor, Dr. M. Kumar Raja, Associate Professor, Dr. M. Moovendhan, Associate Professor, Dr. G. Yogeswaran, Assistant Professor, Dr. R. Lawrance, Director, MCA Programmes, Dr. S. Vinodh, Assistant Professor and Mr. S. Alagukumar, Assistant Professor from ANJAC, Sivakasi in rubrics preparation, evolvement of OBE methodology for the assessment of question papers and for the entire process of evaluation.

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Executive Summary

Investments in education at all levels have been one of the core attributes of Tamil Nadu's distinct development trajectory. Tamil Nadu is known for its high levels of enrolment of both boys and girls in higher education. In fact, its current GER is higher than what the NEP has set as a goal for all India in 2030. Nevertheless, a few second-generation issues need to be addressed in the context of higher education in the state to ensure that investments in higher education translate into better outcomes in terms of developing human capabilities and generating quality employment. One issue that stands out is the perceived poor quality of learning outcomes in higher education. Updating curricula and syllabi may not ensure better competencies among students if the quality of learning outcomes is undermined by inadequate reforms in the process of evaluation.

Criteria such as the adoption of Bloom's revised taxonomy for generating question papers have been recommended repeatedly by regulators of higher education. It is however not clear whether examination papers conform to the norms prescribed. To address this gap, the State Planning Commission (SPC) undertook an evaluation of a sample set of question papers in the humanities, social sciences, natural sciences and engineering subject drawn from a representative set of universities along with a panel of experts. The following is a summary of results and recommendations emanating from the analysis.

Questions largely require straightforward and factual recall or understanding of information. They do not challenge students to think deeply and demonstrate their knowledge to apply or analyse.

Often, question papers offer choices between higher-order questions and lower-order questions for the same set of marks. This allows the students the possibility of skipping higher-order questions to score marks.

At times, verbs that seemingly demand higher order thinking skills such as

'Analyse' are used to frame questions, but without the questions demanding exercise of such analytical abilities.

Typographical errors / errors in Tamil translation are noticed.

Quality of the Question Papers thus require large-scale improvement.

The following are key recommendations.

Implementation of Outcome Based Education (OBE) should be carried out with a proper understanding of the significance of OBE.

Examiners should be trained to design question papers that align with the specified levels of revised Bloom's Taxonomy to assess the students' knowledge and understanding across all levels of cognitive complexity.

Increasing the share of higher-order questions may lead to a higher failure rate among students if done immediately. There should be a gradual movement towards increasing the share of marks that can be obtained only through the exercise of higher-order skills. For example, it can be increased from 10 percent to 50 percent over a period of 5 years with clear guidelines to teachers on how to train students to take on questions with higher-order skills.

While individual universities are given autonomy over the syllabus design, a common set of competencies (graduate attributes) should be identified for each programme (undergraduate degree) independent of the college or university where the course is offered. Tamil Nadu State Council for Higher Education (TANSCHE) can develop the benchmark for competencies or graduate attributes with the aid of a panel of experts for each discipline. The panel can include international experts. Tapping into the diasporic academic community may be helpful in this regard.

Such competency identification can then be used to generate a set of specific indicators of skill sets (programme outcomes) essential to acquire at the end of a programme. The competencies can thus form the basis on which specific course outlines and outcomes can be developed.

Given the fees charged for examinations across Universities, there is ample scope to invest in improving the quality of examinations through better incentives for paper setters, scrutinisers and academic auditors.

Improving the quality of question papers without ensuring the quality of evaluation may not be helpful. Any effort to address the quality of examination therefore must simultaneously engage with both the setting of question papers as well the quality of evaluation of answer sheets. A transparent audit of the evaluation of answer sheets may be put in place by TANSCHE.

The work undertaken by the Board of Examiners and the Board of Scrutinizers should be continuously monitored and evaluated. (TANSCHE) should ensure the quality and transparency of the audit process.

Academic audits of question papers and evaluations undertaken by autonomous colleges may also be carried out.

Best practices in evaluation need to be identified, acknowledged and used to incentivise adoption of similar practices in other educational institutions.

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1

Introduction

Investments in education at all levels have been one of the core attributes of Tamil Nadu's distinct development trajectory. Tamil Nadu is known for its high levels of enrolment of both boys and girls in higher education. In fact, its current GER is higher than what the NEP has set as a goal for all of India in 2030. Nevertheless, a few second-generation issues need to be addressed in the context of higher education in the state to ensure that investments in higher education translate into better outcomes in terms of developing human capabilities and generating quality employment. One issue that stands out is the perceived poor quality of learning outcomes in higher education. While there is data to suggest that the state does not do well enough in terms of learning outcomes in primary and secondary education, reports in the media on perceptions of potential employers suggest that students passing out of college too are not adequately equipped with the requisite skills that are associated with an undergraduate degree. Though there is no hard data on this metric, given the importance of human competencies to the state's development, it is important to understand some key elements of the standards of education imparted at the tertiary level in the state.

Further, with the digital revolution and abundance of access to information, there is less need for remembering and recalling information. As Rose Luckin, Professor of learner-centred design at the University College London, points out "Rather than teaching students only how to collate and memorise information, we should prize their ability to interpret facts and weigh up the evidence to make an original argument"(Luckin, 2023). In a similar vein, the All-India Council for Technical Education (AICTE) too, highlights the need to go beyond memorising.

"In the present examination system, memorization occupies a dominant place. The recall of factual knowledge, though essential to any examination, is only one of several major abilities to be demonstrated by the graduates. The assessment process must also test higher level skills viz. ability to apply knowledge, solve complex problems, analyse, synthesise and design. Further, professional skills like the ability to communicate, work in teams, lifelong learning have become important elements for employability of the graduates. It is important that the examinations also give

appropriate weightage to the assessment of these higher-level skills and professional competencies." (AICTE, 2018, p.12).

The University Grants Commission (UGC) has called for an overhaul of the examination system, pointing to issues with the current pattern.

"In India, higher education has so far been largely examination oriented. The examination pattern that currently exists in University structure, test memory learning….. This system, more often than not, insulates students from the quest of knowledge, excitement of discovery and joy of learning." (2019, pg.11)

The issue assumes greater traction in the context of the potential for employment and unemployment posed by rapid evolution of AI based technologies. Students are more likely to benefit through exposure to critical thinking and problem-solving skills than in the past. This in turn calls for closer attention to the pedagogy and the emphasis given to learning outcomes rather than mere revision of curricula.

One important dimension of the quality of education pertains to the quality of evaluation undertaken of the student's learning. Teaching – learning – evaluation are the cornerstones of any education system. The Outcome Based Education (OBE) of AICTE and the Learning Outcome based Curricular Framework (LOCF) of UGC stress the need for quality assessments to ensure expected outcomes from the learners. William G. Spady, the proponent of Outcome Based Education (OBE) described OBE as a reorientation in the educational system towards what is essential for all students to be successful at the end of their learning experiences. Attention to enhancing the quality of questions posed during evaluation will impact the nature of learning processes in the classroom. Teachers will be incentivised to ensure that students are able to critically use the concepts taught in the classroom and/or apply them to understand real-world phenomena. Criteria such as the adoption of Bloom's revised taxonomy for generating question papers have been recommended repeatedly by regulators of higher education (AICTE, 2018). It is however not clear whether examination papers of state universities conform to such norms.

To address this issue, the State Planning Commission (SPC) undertook an evaluation of a sample set of question papers in the humanities, social sciences, natural sciences and engineering drawn from a representative set of state universities along with a panel of experts.

2

Institutions and subjects selected For evaluation

Six Universities offering Arts and Science courses (including social sciences) and one university offering Engineering Education are chosen. The following is the list of universities chosen.

1. University of Madras, Chennai
2. Bharathidasan University, Tiruchirappalli
3. Bharathiar University, Coimbatore
4. Manonmanium Sundaranar University, Tirunelveli
5. Thiruvalluvar University, Vellore
6. Anna University, Chennai

In the first Six Universities, the following Arts and Science Programmes / Subjects were taken for analysis.

Table 1: Arts and Science Subjects taken for Analysis

ARTS SUBJECTS
B.A. English
B.A. Tamil
B.A. Economics
B. Com
Science Subjects
B.Sc. Physics
B.Sc. Chemistry
B.Sc. Botany
B.Sc. Mathematics

For the Engineering undergraduate degree program, the following Subjects were taken for analysis.

Table 2: Engineering Subjects taken for Analysis

ENGINEERING SUBJECTS
B.E. Civil
B.E. Mechanical
B.E. Electrical and Electronics
B.E. Electronics and Communication
B.E. Computer Science
B.E. Information Technology
B.E. Biotechnology

3

Method Adopted

The semester-end University examination question papers from 7 different Tamil Nadu state universities are taken up for analysis. Core subject question papers (QPs) alone are taken up for evaluation.

For Arts and Science subjects, a total of 288 papers are taken up for evaluation as explained in the table below.

Table 3: Number of QPs taken for arts and science subjects across 6 universities

Arts Subjects	**Number of QPs**	**Number of Universities**	**Number of QPs analysed across universities**
B.A. English	6	6	36
B.A. Tamil	6	6	36
B.A. Economics	6	6	36
B. Com	6	6	36
Science Subjects			
B.Sc. Physics	6	6	36
B.Sc. Chemistry	6	6	36
B.Sc. Botany	6	6	36
B.Sc. Mathematics	6	6	36
Total			**288**

For engineering subjects, 8 papers each in 7 Subjects are analysed as explained in the table below.

Table 4: Number of QPs taken for engineering subjects

Engineering Subjects	Number of QPs
B.E. Civil	8
B.E. Mechanical	8
B.E. Electrical and Electronics	8
B.E. Electronics and Communication	8
B.E. Computer Science	8
B.E. Information Technology	8
B.E. Biotechnology	8
Total	**56**

Question papers of the last examination before the COVID-19 pandemic (2018-19) and the corresponding syllabi are used for evaluation. This is done to avoid the possibility of using question papers whose standards maybe lowered due to college closures during the COVID period.

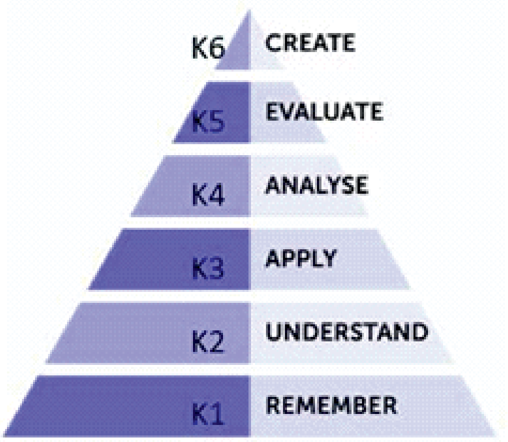
4

Evaluation Process

The quality of questions posed will determine the effectiveness of the teaching process, whether it is OBE or LOCF. Both OBE and LOCF follow Bloom's revised taxonomy to underscore the importance of the quality of questions asked to gauge the efficacy of evaluation.

Bloom's taxonomy (as portrayed in Figure 1) consists of six cognitive levels: remembering (K1), understanding (K2), applying (K3), analyzing (K4), evaluating (K5), and creating (K6). These knowledge levels are arranged in a hierarchical order, with each level building on the previous one. The lower levels are considered basic or foundational, while the higher levels are more complex and require deeper thinking and understanding.

Figure 1: Bloom's revised taxonomy pyramid



Revised Bloom's taxonomy includes verb forms instead of nouns for identifying and reflecting on different levels of thinking. The bottom level of the pyramid which was knowledge (before) was replaced by remembering, as knowledge is a product of thinking and not a form of thinking per se. Remembering (K1) is all about recalling information, listing, recognizing, and naming. The second level of the pyramid is about understanding (K2) and covers explaining concepts or ideas, summarising or explaining them. The third level of the pyramid involves applying (K3) which refers to the ability to use the information in a different context.

The fourth level is of analysing (K4) which breaks the gained information into various parts so as to explore relationships, compare and deconstruct, interrogate and organise them. The fifth level is about evaluating (K5). This requires an ability to justify a course of action, hypothesise, critique, and experiment. The sixth level (K6) is the topmost level which corresponds to the ability to create, generate new ideas, new design, etc.

While evaluating question papers, the main task is to identify the level of cognitive complexity level that each question is targeting. This can be done by analyzing the verbs used in the question. For example, a question that asks students to recall information from a lecture or textbook targets the "remembering" level, while a question that requires students to analyze or evaluate information targets the higher levels of Bloom's taxonomy. However, mere examination of choice of verbs is inadequate if the scope of ‘evaluation’ or ‘analysis’ is insufficient to warrant the choice of such verbs. The action verbs need to be therefore seen in conjunction with the rest of the question to identify an appropriate level. Once the level of cognitive complexity has been identified, the next step is to ensure that the question aligns with the learning objectives of the course or lesson. For example, if the learning objective is to analyze a particular concept, then the question should require students to analyze information rather than simply recall it.

In addition to aligning questions with learning objectives, it is important to ensure that questions are clear, concise, and unambiguous. This can be achieved by using simple language and avoiding complex sentence structures. Using Bloom's taxonomy to evaluate question papers can help ensure that the assessment aligns with learning objectives, targets the appropriate level of cognitive complexity, and promotes deeper thinking and understanding among students.

A few examples of the words used to assess the learning levels are tabulated

Table 5: Bloom's Taxonomy Action Verbs

Knowledge (K1)	Understand (K2)	Apply (K3)	Analyze (K4)	Evaluate (K5)	Create (K6)
define	explain	solve	analyze	reframe	design
describe	discuss	apply	compare	criticize	compose
list	interpret	illustrate	classify	evaluate	create
name	summarize	calculate	contrast	order	formulate
state	compare	sketch	distinguish	appraise	combine

Source: Modified from Anderson et al., (2001)

Following the categorisation of specific questions, the next step is to look at the overall structure of the question paper in terms of

a) The share of total marks that can be obtained by answering questions across different levels of Bloom's taxonomy,

b) The extent to which the questions are in line with expected learning outcomes and

c) The time allotted and the clarity with which questions are posed.

If the question paper tests higher order thinking skills of students adequately, the questions cover all important components of the syllabus, posed clearly and given adequate time to answer, it can be classified as a 'good' question paper, answering which will reflect the actual ability of the learners as well as the learning outcome of the entire process. The ability of a student to answer such a paper well is therefore an indication of the pedagogical practices in the classroom, and hence of 'quality of education'.

5

Selection of evaluating institutions

Through discussions with educationists and visits to higher education institutions, the SPC identified two partner institutions to aid the evaluation process. Ayya Nadar Janaki Ammal College (ANJAC), Sivakasi undertook the evaluation of arts and science course examination papers, and Bannari Amman Institute of Technology (BIT), Sathyamangalam undertook the evaluation of engineering course examinations. Both have a history of working on question papers in line with the revised Bloom's taxonomy for their internal examinations as well as working as mentors to other institutions to improve the standards of evaluation.

A workshop was conducted along with the two institutions to develop a framework and rubrics to carry out the evaluation. An expert team was constituted from each of the two academic institutions to undertake the evaluation with the support of the SPC. All the members are acquainted with Bloom's Taxonomy and practice it in their routine class preparations, teaching, and assessment.

Engineering is a discipline that focuses more on applications of concepts whereas natural and social science courses require attention to understanding of concepts as well as application. As a result, it was decided to have two separate evaluations done for the two sets of courses, but within the overall framework described earlier.

6

Evaluation process for Arts and Science Courses

- The question papers were subjected to preliminary evaluation for identifying errors-typo, translation, and grammatical.
- The corrected question papers were then scrutinised for action verbs correction, clarity, missing data/incomplete information, and misleading unwanted information(s).
- Six question papers are selected randomly from each group and the syllabus was checked for its relevance as per today's needs and Course Outcomes (COs)/ Program Outcomes (POs).

Second part: Actual Evaluation

- Rubrics for evaluating question papers are then developed.
- 288 question papers (Six Universities × 8 Subjects (4 Arts + 4 Science) × 6 question papers = 288) are then audited.

Rubrics Description – Arts and Science degree program

1. To what extent the Question Paper reflects the expected outcomes of the course?

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%
5	4	3	2	1

2. Scope for measuring different levels of knowledge.

Very High	High	Medium	Low	Very Low
5	4	3	2	1

3. Coverage of all the components of the contents of the course

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%
5	4	3	2	1

4. Possibility for Omitting Questions which requires higher order thinking skills for answering. Give Score 1 to 5 for "High Possibility" to "No Possibility".

5. Percentage of Typographical Error/ Ambiguity/ Repetitive/ Irrelevant Questions

0%	1% to 5%	6% to 10%	11% to 15%	above15%
5	4	3	2	1

6. Scope for out of the box thinking.

16% to 20%	12% to 16%	8% to 12%	4% to 8%	below 4%
5	4	3	2	1

7. The Time required to answer all the questions by an average student in a 3-Hour exam

3 Hours	2.5 to 3 Hrs	2 to 2.5 Hrs.	1.5 to 2 Hrs.	below 1.5
5	4	3	2	1

Grade Level

Upto 15	16 - 20	21 to 25	26 to 30	31 to 35
Unfit	Low	Moderate	Good	Excellent

Third part : Suggestions and recommendations

- General and specific suggestions and recommendations are listed subject-wise in a consolidated form.

In this report, the focus is more on knowledge levels that the questions seek to address and less on whether the questions are in line with course outcomes. This is because, the course outcomes in themselves are not well developed in some instances. The UGC guidelines for evaluation reforms highlight the need to develop appropriate learning outcomes following which program and course outcomes can be derived. The SPC shall undertake a separate analysis of this gap in another report.

7

Mechanism of Design of the Template for Evaluation of Question Paper

A typical question paper should contain elements that identify the following quality parameters to satisfy the standards of a University Examination. These elements have been classified into seven attributes.

i. Match between expected course outcomes and questions posed.

ii. Scope for testing multiple comprehension levels (K1-K6) of the students.

iii. Syllabus coverage

iv. Reduced possibility of students to omit questions that require higher order thinking skills.

v. Scope for out-of-box thinking by the students (Expressing creativity and lateral thinking)

vi. Time budgeting

vii. Extent of typographical errors and ambiguity in questions posed

As stated earlier, though the analysis covers all the attributes, the emphasis is more on cognition levels that the questions seek to test.

By way of an illustration, the report provides the details of identifying the levels of questions based on Bloom's revised taxonomy.

Illustration 1

Audit of an Economics question paper

(maximum knowledge level available question paper was chosen)

Q. No.	Questions	Bloom's K-level	Explanation of the Knowledge level
SECTION – A (10 x 2 = 20 Marks)			
Answer ALL questions			
1.	How will you define 'Public Finance'?	K1	This question checks the basic understanding of the concept of public finance, hence classified as K1 level.
2.	What is the condition for attaining Maximum Social Advantage?	K1	Again, this requires remembering information, hence K1 level
3.	Differentiate the term 'Impact' from 'Incidence'.	K2	Impact and Incidence are two terms that help differentiate direct tax from indirect tax. Potential to be level K4, but since it is not asked in the context of real world situations, it is enough to remember the respective definitions. Hence K2 max.
4.	Distinguish between Absolute and Relative Taxable capacity.	K2	For same reasons as Qn 3, K2 max
5.	"Income tax is a kind of Progressive tax" – Defend.	K2	Requires a degree of understanding, hence K2.
6.	State any two non-tax revenue to the Government.	K1	Requires only recall of information, hence K1.
7.	What are the effects of public expenditure in India?	K1	Again, requires only recall of information, hence K1.
8.	"Public expenditure reduces Private expenditure" – Assess.	K4	Critical analysis of both public expenditure and private expenditure should be made and hence, requires higher order skills (K4)

9.	Identify the objectives of public debt.	K1	Requires memorising the set of objectives, hence K1.
10.	Analyze the term 'Budget'.	K2	Qn is vague as no specific dimension of analysis is indicated despite using the action verb 'Analyse' (K2 max)
SECTION – B (5 x 5 = 25 Marks)			
Answer ALL questions choosing either (a) or (b)			
11a.	Explain the role of Government in the modern society.	K2	Requires understanding of multiple functions that the state has to play in a modernising society. So K2
OR			
11b.	Outline the difference between 'Public Finance' and 'Private Finance'.	K2	Requires understanding of multiple functions that the state has to play in a modernising society. So K2
12a.	Make use of canons of taxation to identify the best kind of taxation.	K3	The characteristics of a good tax is to be applied to check the strength of fiscal federalism(i.e.,to attain the CO2). Hence, closer to K3.
OR			
12b.	Identify the difference between tax and non-tax revenues.	K2	Similar to 11 b, hence K2.
13a.	Evaluate the main heads of public expenditure.	K1	Vague, as it basically asks for listing the main heads. The verb 'Evaluate' is misleading. Hence K1
OR			
13b.	Appraise the effects of public expenditure.	K2	Appraisal requires an awareness and understanding of the positive and negative effects of public spending, hence K2.
14a.	Differentiate 'Productive Expenditure' from 'Unproductive Expenditure'.	K2	Again, though this seems like a higher order level question, it does not test the student's ability to reflect. Hence K2
OR			
14b.	Analyze the causes for the growth of public debt in India.	K3	As the qn stands, the student is expected to not just state the causes, but analyse the causes of growth of public debt, hence K3.

SECTION – C (3 x 10 = 30 Marks)			
Answer ALL questions choosing either (a) or (b)			
15a.	Discuss the characteristics of a good budget.	K2	Expected to reproduce a set of principles, rather than evaluate an actual budget. Hence K2 max.
OR			
15b.	Predict the trend of Public Debt in India.	K3	'Predict' requires reasoned forecasting based on past trends. Hence requires higher order thinking skills. (K3-4)
16a.	Explain the Principle of Maximum Social Advantage.	K2	To understand the fiscal federalism, one must know the principle of Maximum social advantage. Hence, this question is at K2 level.
OR			
16b.	Summarize the factors determining the taxable capacity.	K2	Requires summarising information, hence K2 max.
17a.	Evaluate the current tax system in India.	K4	This requires positing India's tax system against normative principle of sound taxation and arriving at a reasoned opinion. Hence higher order skills (K4).
OR			
17b.	Justify the causes for the growth of public expenditure in India.	K3	Partly overlaps with 15 b. But requires the student to reason out a particular position. Hence K3.
18a.	Discuss the methods of repayment of public debt.	K2	Again, demands only recall of information on different methods, and their pros and cons (K2).
OR			
18b.	Elaborate the present fiscal policy of India.	K2	Elaboration does not require higher order analytical skills, so K2

Assessment of Economics
Question Paper III B. A. Economics, Fiscal Economics-I

		K1	K2	K3	K4	K5& K6	TOTAL
Part A	Q. No.	**1,2,6,7,9**	**3,4,5,10**		**8**		
	Marks	**2,2,2,2,2**	**2,2,2,2**		**2**		**20**
Part B	Q. No.		**11a,11b,14a, 14b,15a**	**12a,12b, 15b,**			
	Marks		**5,5,5,5,5**	**5,5,5**			**40**
Part C	Q. No.	**13a,13b**	**16a,16b,18a, 18b**	**17b**	**17a**		
	Marks	**5,5**	**10,10,10,10**	**10**	**10**		**70**
		20	**73**	**25**	**12**		**130**

ANALYSIS: K1 accounts for 15.4% of the marks in the question paper

K2 level accounts for 56.2% of the marks and

K3 accounts for 19.2% of the total marks

K4 accounts for 9.2% of the total marks.

There are no questions for K5 and K6 levels

Thus, the student can clear the exam with ability to recall and basic understanding of the subject.

The following table illustrates how the paper ranks in terms of the 7 parameters identified on a 5-point scale.

Table 6: Fiscal Economics-I, Mandatory Parameters

1. To what extent the Question Paper reflects the expected outcomes of the course?

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%	**SCORE**
5	4	3	2	1	**2**

2. Scope for measuring different levels of knowledge.

VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW	**SCORE**
5	4	3	2	1	**2**

3. Coverage of all the components of the contents of the course

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%	**SCORE**
5	4	3	2	1	**2**

4. Possibility for Omitting Questions which requires higher order thinking skills for answering. Give Score 1 to 5 for "High Possibility" to "No Possibility". **1**

5. Percentage of Typographical Error/ Ambiguity/ Repetitive/ Irrelevant Questions

0%	1% to 5%	6% to 10%	11% to 15%	Above15%	**SCORE**
5	4	3	2	1	**4**

6. Percentage of Typographical Error/ Ambiguity/ Repetitive/ Irrelevant Questions

16 to 20%	12% to 16%	8% to 12%	4% to 8%	Below 4%	**SCORE**
5	4	3	2	1	**1**

7. The Time required to answer all the questions by an average student in a 3-Hour exam

3 Hours	2.5 to 3Hrs.	2 to 2.5Hrs.	1.5 to 2Hrs.	Below 1.5hrs	**SCORE**
5	4	3	2	1	**3**

Grade Level

Upto 15	16 - 20	21 to 25	26 to 30	31 to 35
Unfit	Low	Moderate	Good	Excellent

Illustration 2

Sixth Semester Terminal Examination Solid State Physics
(maximum knowledge level available question paper was chosen)

B.Sc., Physics, SOLID STATE PHYSICS - 3 Hrs, 60 marks			
Q. No.	**Questions**	**K**	**Explanation of the Knowledge level**
SECTION – A (5 x 2 = 10 Marks)			
Answer ALL questions			
1.	Compute the reciprocal lattice to simple cubic lattice is also simple cubic.	**K2**	To understand the knowledge of reciprocal lattice of simple Cubic structure
2.	In which magnetic materials, the magnetic anisotropy property is followed.	**K1**	To remember the concept of anisotropic property.
3.	What is cohesive energy.	**K1**	To remember the concept of cohesive energy.
4.	The dc resistance of a superconductor is practically zero. What about its ac resistance.	**K1**	To remember the concept of ac resistance.
5.	List out the physical method of nanoparticle synthesis.	**K1**	To remember the physical method of nanoparticle synthesis among different methods.
SECTION – B(5 × 4= 20 Marks)			
6a.	Examine the crystal structures of sodium chloride and Diamond. (OR)	**K2**	To understand the crystal structures
6b.	Infer the atomic radius and atomic packing factor of the hexagonal close-packed structure.	**K2**	To understand the hexagonal close-packed structure

7a.	Compute the electronic polarizability of dielectric materials. (OR)	**K2**	To compute the concept of dielectric polarizability
7b.	Categorize the different polarization mechanisms of dielectric materials.	**K2**	To breakdown the concept of polarization mechanisms
8a.	Evaluate the Madelung constant for sodium chloride	**K2**	Misleading use of the term 'evaluate'
8b.	Deduce the variation of interatomic force with interatomic spacing.	**K2**	Deduction of changes due to changes in another variable
9a.	Evaluate the critical current for a wire of lead having a diameter of 1mm at 4.2 K, the critical temperature for lead is 1.8 K and Hc(0) =6.54A/m	**K2**	Again wrong use of the term 'evaluate'
9b.	In a superconducting material, Isotopic mass is 199.5 amu and critical temperature is 5K. compute isotopic mass at 5.1 K.	**K2**	To evaluate the isotopic mass at 5.1 K
10a.	Summarise the properties of nanomaterials.	**K1**	To remember
10b .	Outline the applications of nanomaterials	**K1**	To remember and understand the applications.
SECTION – C (3 × 10= 30 Marks)			
11a.	Elucidate the reciprocal lattice vector for BCC an FCC lattice	**K3**	Involves a process of deduction and hence reasoning
11b.	Deduce the different types of bonding in crystals.	**K3**	Involves a process of deduction and hence reasoning

12a.	Explain Langevin's theory of paramagnetism.	**K1**	To remember the concept of paramagnetism
12b.	Outline the domain theory of the ferromagnetism.	**K1**	To remember the concept of ferromagnetism
13a.	Elaborate the top-down and bottom-up approaches of nanoparticle synthesis.	**K2**	To compile the nanoparticle synthesis procedures
13b.	Formulate high-temperature superconducting materials for practical applications.	**K2**	To compile the applications of superconducting materials

Assessment of SOLID STATE PHYSICS Question Paper

		K1	K2	K3	K4	K5& K6	TOTAL
Part A	Q. No.	**2,3,4,5**	**1**				
	Marks	**2,2,2,2**	**2**				**10**
Part B	Q. No.	**10a, 10b**	**6a,6b,7a,7b, 8a,8b,9a,9b**				
	Marks	**4,4**	**4,4,4,4, 4,4,4,4**				**40**
Part C	Q. No.	**12a,12b**	**13a,13b**	**11a, 11b**			
	Marks	**10,10**	**10,10**	**10,10**			**60**
		36	**54**	**20**			

ANALYSIS:

K1 level accounts for 32.7% of the total marks

K2 level accounts for 49.1% of the total marks

K3 level accounts for 18.2% of the total marks

There are no questions for higher K-Levels

Table 7: SOLID STATE PHYSICS, Mandatory Parameters

1. To what extent the Question Paper reflects the expected outcomes of the course?

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%	**SCORE**
5	4	3	2	1	**4**

2. Scope for measuring different levels of knowledge.

VERY HIGH	HIGH	MEDIUM	LOW	VERY LOW	**SCORE**
5	4	3	2	1	**2**

3. Coverage of all the components of the contents of the course

80% to 100%	60% to 80%	40% to 60%	20% to 40%	Upto 20%	**SCORE**
5	4	3	2	1	**3**

4. Possibility for Omitting Questions which requires higher order thinking skills for answering. Give Score 1 to 5 for "High Possibility" to "No Possibility".

5. Percentage of Typographical Error/ Ambiguity/ Repetitive/ Irrelevant Questions

0%	1% to 5%	6% to 10%	11% to 15%	Above15%	**SCORE**
5	4	3	2	1	**3**

6. Scope for out of the box thinking.

16% -	12% -	8% -	4% -	Below	**SCORE**
5	4	3	2	1	**3**

7. Percentage of Typographical Error/ Ambiguity/ Repetitive/ Irrelevant Questions

20%	16%	12%	8%	4%	**SCORE**
5	4	3	2	1	**3**

8. The Time required to answer all the questions by an average student in a 3-Hour exam

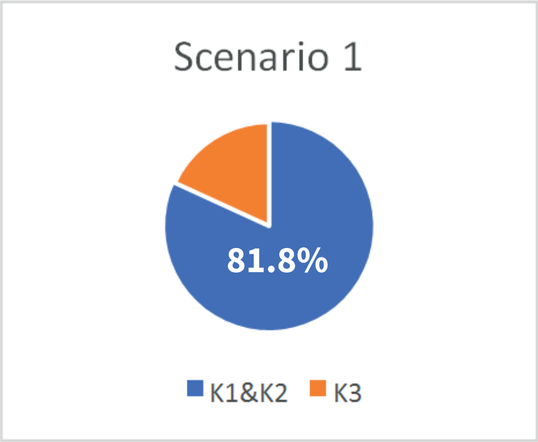
3 Hours	2.5 to 3Hrs.	2 to 2.5Hrs.	1.5 to 2Hrs.	Below 1.5hrs	**SCORE**
5	4	3	2	1	**3**
				TOTAL	**21**

Grade Level

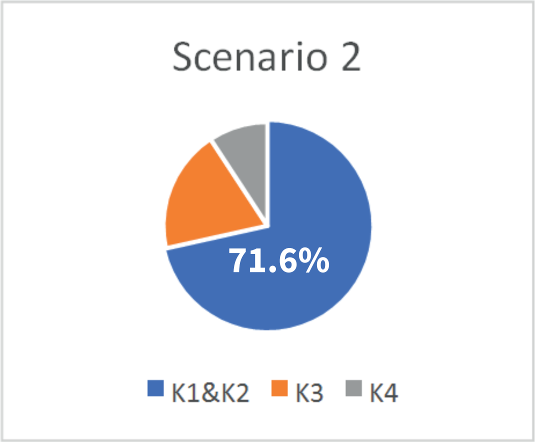
Upto 15	16 - 20	21 to 25	26 to 30	31 to 35
Unfit	Low	Moderate	Good	Excellent

Other question papers are evaluated along similar lines and marked on a 5-point scale.

FISCAL ECONOMICS



SOLID STATE PHYSICS



Scenario 1: Considering the case if the students choose to answer lower order level (81.8 %) where the knowledge level is not matching.

Scenario 2: Considering the case if the students choose to answer lower order level (71.6 %) where the knowledge level is not matching.

8

Measure of Knowledge Levels

Here, the results of analysis of quality of questions solely in terms of knowledge levels and the scope for omitting higher-order questions are given.

Table 8: Results of analysis

Universities and Subjects	Scope for measuring different levels of knowledge	Possibility for omitting the questions which require higher-order thinking skills for answering
University-I	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-6	2	3
English QP 1-6	3	3
Maths QP 1-7	3	3
Physics QP 1-6	3	1
Chemistry QP 1-6	3	2
Botany QP 1-6	2	1
Economics QP 1-6	4	3
University-II	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-6	1	4
English QP 1-6	2	2
Maths QP 1-7	4	3
Physics QP 1-6	3	1
Chemistry QP 1-6	3	1
Botany QP 1-6	2	3
Economics QP 1-8	3	3
Commerce QP 1-6	2	1

University-III	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-6	2	3
English QP 1-6	3	3
Maths QP 1-7	4	3
Physics QP 1-6	3	1
Chemistry QP 1-6	3	2
Botany QP 1-6	3	1
Economics QP 1-6	3	2
Commerce QP 1-6	2	2
University-IV	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-6	2	3
English QP 1-6	2	3
Maths QP 1-7	3	4
Physics QP 1-6	4	3
Chemistry QP 1-6	3	4
Botany QP 1-6	2	3
Commerce QP 1-6	2	2
Economics QP 1-6	3	3
University-V	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-6	1	3
English QP 1-6	3	4
Maths QP 1-7	4	3
Physics QP 1-6	3	1
Chemistry QP 1-6	3	3
Botany QP 1-6	2	1
Commerce QP 1-6	2	3
Economics QP 1-6	2	3

University-VI	question 2 (average across QP 1-6)	question 4 (average across QP 1-6)
Tamil QP 1-4	1	4
English QP 1&2	3	3
Maths QP 1&2	2	4
Physics QP 1&2	2	1
Botany QP 1-3	3	3
Economics QP 1-8	4	4

Legend: Scope for measuring different levels of knowledge (Question 2) takes a value from 1 to 5 with 1 indicating very low scope, 2 for low scope, 3 for medium scope, 4 for high scope and 5 for very high.

When it comes to possibility of omitting the questions that require higher order thinking skills (Question 4), the scoring is as follows – 1 shows a high possibility of omitting, 2 shows a medium possibility, 3shows a low possibility, 4 shows a very low possibility and 5 shows no possibility to omit those questions that require higher order thinking skills.

From the above table, only a few question papers have the scope to test higher order skills of students. Only four subjects namely maths, physics, chemistry and economics have medium scope for measuring higher levels of cognition. It can also be inferred from the above table that for University I, there is a high possibility of omitting those questions that require higher order thinking skills in Physics, Chemistry and Botany. In English, there is a medium possibility for omitting and for subjects like Tamil, Maths, and Economics, there is low possibility of omitting question that require higher order thinking skills. The latter is also due to the absence of adequate number of higher order questions.

Based on this process, in the next section, the report provides a summary of observations based on analysis of question papers of the 8 subjects.

9

Results

Specific Observations across universities

Specific university–wise and subject-wise observations are made here, and the Analysis documents are given in the Annexure.

University - I

Subject	Overall Analysis on the Quality of Question Papers
1. B. A. Tamil	• Grammatical mistakes and Typographical errors are found in the questions papers. • Lower K-level questions are more prevalent compared to Higher K-level questions. • In Part A, there are too many multiple-choice questions (for 40 marks).
2. B. A. English	• Since there is no mention of course code or title of the paper, the question paper is ambiguous. • Lower K levels questions are more in number. • Least provision for testing K5-K6 level of students, some questions are unclear. • Typographical errors and grammatical errors are found in the options given in section -A.
3. B.Sc. Mathematics	• Question papers are of medium standard. • Errors–(typographical/logical/translational) were found. • Few Incomplete questions • Questions fail to provoke the students to think "out of the box" • In all the Sections, having open-choice (either-or) questions, leads to the possibility of omitting higher knowledge-level questions.
4. B.Sc. Physics	• Open choice is given in all three sections. • Section-A questions are testing remembering skills (lower K-level) alone. • 50% percentage of the questions in some question papers are of lower knowledge level • Equal weightage is not given to all units in the syllabus. • Logical errors are found in few question papers.
5. B.Sc. Chemistry	• No scope for testing higher-order thinking.

6. B.Sc. Botany	• Question papers are testing mostly lower order skills • Uneven distribution of questions across units • Some questions are worded awkwardly. • Errors–typographical / logical / translational are found. • Questions did not provoke the students to think “out of the box”. • Too many choices for the students.
7. B. A. Economics	• Translation Errors, Typographical Errors and Grammatical Errors are common. • Lower K-level questions are more in number. • Standard of some questions are good

University - II

Subject	Overall Analysis on the Quality of Question Papers
1. B. A. Tamil	• Grammatical and Typographical errors are very low. • Lower K-level questions are more compared to Higher K- level questions. • The question papers must be upgraded and should kindle the creativity of students. • Question that requires one- or two-word answers are more in number.
2. B. A. English	• Questions have many typos and grammatical errors. • Clarity was missing in many questions. • Unit-wise distribution of questions is uneven. • Question framing was very poor. • Not enough higher order creative questions • Most of the questions are of K1/K2 levels.
3. B.Sc. Mathematics	• Question papers are of medium standard. • In Part B and C, either-or type questions are not in the same knowledge level as well as weightage based on marks. • Errors – typographical / logical / translational are found. • Few Incomplete questions. • Questions failed to provoke the students to think “out of the box” or creatively. • In Part C, open-choice (either-or) questions lead to the possibility of omitting higher knowledge questions.

4. B.Sc. Physics	• In Part-B, Either... or... questions do not have the same knowledge level in several cases • In Part-A and Part-B open choice system is followed that allows for omitting of higher order questions • Lack of sufficient number of problem-solving questions • Equal weightage is not given to all units
5. B.Sc. Chemistry	• Most of the questions are direct questions requiring only lower K-level knowledge. • Not enough problem-solving questions
6. B.Sc. Botany	• Aimed at addressing only the slow learners. • Question paper helps to ascertain only lower-knowledge levels of the students. • Errors – typographical / logical / translational are minimal. • Questions for "out of box thinking" by students are negligible
7. B. A. Economics	• Translation and typographical errors are minimal. • Lack of sufficient number of applied problem-based questions. • Lower K-level questions are more in number. • Standard of the questions are of moderate level.
8. B. Com.	• Questions are from lower knowledge levels largely. • Less scope for application-based questions • Unevenly distributed questions across units • Some questions have logical errors

University - III

Subject	Overall Analysis on the Quality of Question Papers
1. B. A. Tamil	• Grammatical mistakes and Typographical errors are very low. • Lower K-level questions are more in number. • Some Question papers are too lengthy which require more time. Time budgeting is not considered.
2. B. A. English	• Some questions are ambiguous and repetitive. • Many typo errors are found. • Uneven unit-wise distribution of questions • Very less scope for testing K-6 level of students (Creativity & out of the box thinking) • Most of the questions are of K1/K2 basic levels (remembering / understanding)

3. B.Sc. Mathematics	• Question papers are of medium standard. • In Part B and C, either-or type questions are not in the same knowledge level, but have the same weightage based on marks • Errors – typographical / logical / translational are found. • Few Incomplete questions • Questions fail to provoke "out of box thinking."
4. B.Sc. Physics	• In Part-A, multiple choice questions have all four choices as incorrect in some of the question papers. • Few questions are irrelevant and (some logical) and typographical errors are found in few question papers. • In Part - B and Part - C, Either… or… choice givenat different knowledge level to assess the exact outcome of individual student.
5. B.Sc. Chemistr y	• Enough scope for testing problem solving skills, but are not tested. • Sec-B questions are in Sec-C, and vice versa. • There are number of Tamil translation errors and typographical errors.
6. B.Sc. Botany	• Repetition of questions in some question papers • Typographical error and Tamil translation errors are common. • Little scope for "out of box thinking". • Students may not have sufficient time to address all the questions within the stipulated time for some papers. • The questions are designed only at lower knowledge levels
7. B. A. Economics	• Translation error, typographical error and grammatical error found. • Lower K-level questions are more in number. • Standard of the questions are moderate
8. B. Com	• Question paper failed to ascertain the knowledge levels of the students. • Skewedness of questions towards few units • Not enough applied problem-solving questions • Errors – typographical/ logical / translational • No scope for "out of box thinking"

University - IV

Subject	Overall Analysis on the Quality of Question Papers
1. B.A. Tamil	• Grammatical mistakes and Typographical errors are low. • Lower K-level questions are more in number.
2. B.A. English	• Questions are of moderate quality. • Many questions have scope (choice) foromitting Questions which requires higher-order thinking skills. • Some questions are ambiguous and repetitive. • Many typo errors are found. • Uneven unit-wise distribution of questions. • Provision for testing creativity is low.
3. B.Sc. Mathematics	• Question papers are of medium standard. • In Part B and C, either or type questions are not in the same knowledge level. • Question papers failed to ascertain different knowledge levels of the students • Errors – typographical / logical / translational are present
4. B.Sc. Physics	• There are logical errors in some questions. • Some questions are not clear and lead to ambiguity. • Many typographical errors are found in few question papers. • More than 50% percentage of the questions are of lower knowledge level • Weightage given for problem solving questions is low.
5. B.Sc. Chemistry	• There is no scope for out of box thinking questions. • Limited scope for critical thinking. • Typographical errors are observed. • In Part B and part C, questions belong to different knowledge levels. • In few question papers, the same concepts have been repeated in different parts.
6. B.Sc. Botany	• Question papers are of medium standard. • Aimed at addressing all levels of learning ability of the students. • Errors – typographical / logical / translational are noticed. • Questions failed to induce the students to think “out of the box”

7. B. A. Economics	• Translation error, typographical error and grammatical errors are common • Hardly any appliedorreal - world situation-based questions • Unit – wise choice is not given at the time of setting questions • Lower K-level questions are more in number.
8. B. Com.	• Question Papers have not covered all the knowledge levels. • Insufficient number of problem-solving type of questions • Few questions have typographical / logical errors.

University - V

Subject	Overall Analysis on the Quality of Question Papers
1. B. A. Tamil	• Grammatical and typographical errors are very low. • The questions are from Lower K-level. • Questions that require one- or two-word answers are more prevalent in part A. • Time budgeting for answering questions is not considered.
2. B. A. English	• Questions are of moderate quality. • Many questions have scope for omitting Questions which requires higher order thinking skills. • Provision for measuring different levels of knowledge is less. • Some questions are ambiguous. • Typo errors are found. • Lower K-levels questions are more in number.
3. B.Sc. Mathematics	• Errors – typographical / logical / translational errors • Few incomplete questions • In Section C, choice-type questions, leads to possibility of omitting higher knowledge questions. • Weightage of questions are not appropriate
4. B.Sc. Physics	• 'Either… or' questions have different knowledge levels • In part -C, chances of omitting higher knowledge level questions. • More than 50% of knowledge level is of lower knowledge levels (K1 and K2)

5. B.Sc. Chemistry	• Limited scope for checking the critical and creative knowledge of the students. • Typographical errors are present in some question papers. • Most of the questions in part B and C are direct in nature that require just textbook knowledge. • In part B, choice-based questions are set at different knowledge levels. • In few question papers, the same concepts have been repeated
6. B.Sc. Botany	• Question papers are of low standard. • Aimed at addressing the knowledge levels of only the slow learners. • Question paper failed to as certain the different knowledge levels of the students. • Equal weightage has not been given for all the units. • Major parts of the syllabus are neglected while setting the question paper. • Errors – typographical / logical / translational are prevalent.
7. B.A. Economics	• There are translation and typographical errors. • Short answer questions test only lower knowledge levels. • Scope for omitting higher level knowledge questions. • Questions do not induce the creativity of students • Scope to explore alternate view points are less
8. B. Com.	• Not all topics of the syllabus are given importance. • Some of the questions have grammatical and logical errors. • Most questions are at lower knowledge levels (K1 and K2) • Question papers have not covered all knowledge levels. • Inadequate number of problem-solving questions

University - VI

Subject	Overall Analysis on the Quality of Question Papers
1. Tamil	• Most questions are in the lower K-levels. • As questions are either/or types in part B and part C, the possibility of omitting the higher-level knowledge questions by the students is very high.
2. English	• Most questions do not test students' ability to interpret or create. • Most of the questions are of K1/K2 basic levels. • Many typographical errors are found. • Unit-wise distribution of questions are not even.

2. English	• Question papers are of medium standard. • Many open choice questions, leads to possibility of omitting higher knowledge questions.
3. Mathematics	• Only two types of K-level skills are found. • Overall, 90% of the questions have same Knowledge level.
4. Physics	• Again either-or questions are of different knowledge levels. • Question papers are of good standard. • Questions are aimed at addressing knowledge levels of both slow learners and fast learners.
5. Botany	• Equal weightage has been given for all units. • Errors – typographical/logical/translational are few. • Questions are up to the standard. • Found questions to think out of the box and checked the fast learner's ability also.
6. Economics	• Questions are up to the standard. • Found questions to think out of the box and checked the fast learner's ability also. • Only very few typographical / translational errors found. • Many questions are open-ended, and this leads students to avoid such higher-level questions in choice.

General Observations across the six universities

- Quality of the Question Papers of most Universities require improvement.
- Questions seldom probe the learners competence and cognitive abilities.
- Most questions do not test the students' ability to critically analyse concepts and apply in real life situations. They tend to address mostly the 'remember' and 'understand' dimensions of learning.
- Typographical errors / errors in Tamil translation are noticed.
- In some Universities, though questions that test higher order skills are asked, such questions are grouped with questions of lower order, enabling the students to avoid such questions.

10

Engineering Question Paper Analysis

Program Outcomes ought to ensure that engineering graduates acquire the following attributes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research- based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

The evaluation rubrics and the rating scale for Engineering Stream

Step 1 - The chosen question papers are analysed based on the following evaluation rubrics. The rubrics are prepared considering industrial expectation and opportunity for testing students' thinking ability across different knowledge levels.

Syllabus coverage and equal mark distribution of questions in each unit.

Syllabus coverage: The extent to which the topics and content outlined in a syllabus are covered in question paper.

Equal mark distribution of questions: if a course is divided into five units, and each unit is worth 20% of the total marks, then an equal mark distribution would mean that each unit receives an equal weightage and contributes equally to the final grade.

Adherence of questions to the Course: It refers to the extent to which the questions align with the intended learning outcomes of a course.

Percentage of scope for real-time and non-hypothetical questions: Real-time questions are those that require students to apply their knowledge and skills to current, practical, or real-world situations. Non-hypothetical questions, on the other hand, are questions that do not involve theoretical scenarios.

Percentage of grammatical and spelling errors: Errors/ambiguity in question paper such as missing data/image, table, diagram clarity, and their citation.

Incorrect word choices and incorrect sentence structure: Inappropriate word/phrase selection can sometimes lead to ambiguity or confusion in understanding the questions. Missing data, images, tables or diagrams occur when the necessary information are accidentally omitted from the question paper.

Percentage of adherence of the question paper: Adherence percentage of the question paper to the specified taxonomy levels and its proportion of questions that accurately align with the intended cognitive levels.

Taxonomy framework: Revised Bloom's Taxonomy provides a structured classification of educational objectives that describe different levels of cognitive complexity. These levels typically range from lower-order thinking skills (e.g., remembering or understanding) to higher- order thinking skills (e.g., analyzing or evaluating).

1. Syllabus coverage and equal mark distribution of questions in each unit

Excellent 4	Good 3	Satisfactory 2	Poor 1

2. Adherence of questions to the Course Outcomes

Very High correlation	High Correlation	Medium Correlation	Poor / No correlation
4	3	2	1

3. Percentage of scope for real-time and non-hypothetical questions and out of box thinking

76%-100%	51%-75%	26%-50%	Below 25%
4	3	2	1

4. Percentage of grammatical and spelling errors/ambiguity in question paper such as missing data/image, table, diagram clarity, and their citation.

0%	1%-5%	6%-10%	Above 10%
4	3	2	1

5. Percentageof adherence of the question paper to the specified taxonomy levels.

76%-100%	51%-75%	26%-50%	Below 25%
4	3	2	1

6. Percentage of enough information given in the question for answering higher order level questions.

76%-100%	51%-75%	26%-50%	Below 25%
4	3	2	1

7. Percentage of repetition of the same concepts in different parts of the question paper

76%-100%	51%-75%	26%-50%	Below 25%
4	3	2	1

8. Probability of matching the cognitive level in choices of questions.

Very High	High	Medium	Low
4	3	2	1

Inadequacy: Percentage of enough information given in the question for answering higher order level questions. In some cases, additional clarification or context might be necessary to ensure a meaningful and in-depth answer. Otherwise, it may be challenging to provide a complete answer or may require making assumptions or educated guesses.

Percentage of repetition: same concepts in different parts of the question paper. It assesses the degree of redundancy or duplication of content across various parts of the question paper to ensure a fair and well-rounded assessment of student's knowledge and understanding.

Probability of matching the cognitive level in choices of questions: In either or type pattern, both the options require the same thinking skills to answer the question. This ensures that the choices provide meaningful and reasonable alternatives for the test taker and accurately assess their understanding and reasoning abilities.

Thus, in the case of engineering courses, the question papers have been evaluated along eight parameters.

Actual evaluation of the question papers

1. Analysed, Selected and Listed the rubrics, classified them into eight categories and allotted scores for each category. Based on the consolidated scores, the question papers are graded on a four-point scale as follows.

Final Grading

We provide an analysis of two question papers by way of illustration.

Grade	Below 12	13-17	18-22	23-27	28-32
	Unfit	Poor	Satisfactory	Good	Excellent

Illustration 1

Audit of an Economics question paper

B.E. POWER ELECTRONICS - 3 Hrs, 60 marks			
Q. No.	**Question**	**K Levels**	**Explanation of the Knowledge level**
Part A: Answer all the question			**10 × 2 =20 marks**
1.	What is the purpose of gate driver in SCR based power electronic circuits?	**K1**	It expects students to memorize the role of gate driver circuit.
2.	Why power MOSFET is called as voltage-controlled device?	**K2**	It asks for an explanation or clarification about a specific concept or terminology
3.	List any two advantages of single- phase bridge converter over single phase mid-point converter.	**K2**	It expects students to indicate the advantages of different converter topology.
4.	Define overlap angle.	**K1**	It expects students to memorize the term overlap angle
5.	What is meant by time ratio control in a chopper circuit?	**K2**	It expects students to illustrate the control strategy of chopper.
6.	List any two advantages of resonant converters.	**K2**	It expects students to compare different converter topologies.
7.	What is meant by current source inverter?	**K2**	It expects students to illustrate the concept.
8.	List the difference between online and offline UPS.	**K2**	It expects students to compare different converter topologies.
9.	How power factor can be controlled in single-phase full wave AC voltage controller?	**K2**	It expects students to illustrate the working of single-phase full wave AC voltage controller and the concept of power factor
10.	Which power electronic switch is preferred for the construction of matrix converter?	**K2**	It expects students to identify the characteristics of different power electronic switches.

Part B: Answer all the question			5 × 13 = 65 marks
11a.	Explain the constructional details of enhancement type power MOSFET along with its characteristics.	**K1**	It expects students to memorize the role of gate driver circuit.
OR			
11b.	(b) Explain RC and RCD snubber circuits	**K1**	It expects students to state the working concept of snubber.
12a.	Describe the working of three-phase fully controlled bridge rectifier. Also, derive the expression for average output voltage.	**K2**	It expects students to subsume the concept.
OR			
12b.	A single-phase semi-converter delivers power to RL load with R = 10 Ohm and L = 15 mH. The AC supply voltage is 230 V, 50Hz. Find the average value of output voltage and current for the firing angles of 45degree and 60degree by assuming continuous conduction.	**K2**	It expects students to subsume the concept.
13a.	Describe the working of four quadrant chopper.	**K1**	It expects students to state the concept of working.
OR			
13b.	(b) Explain the working of boost converter with circuit diagram and waveforms.	**K1**	It expects students to state the concept of working.
14a.	Explain how voltage magnitude and frequency can be controlled in three-phase voltage source inverters.	**K2**	It expects students to subsume the concept of controlling techniques.
OR			
14b.	(b) Explain how the space vector modulation technique can be used for the generation of pulses required for inverter.	**K2**	It expects students to subsume the concept of PWM.

Part C: Answer all the question			1 × 15 =15 marks
16a.	A boost converter is supplied from battery of 24 V. The average output voltage and current of boost converter are 72V and 2 A, respectively. The switching frequency is 5 kHz. If L = 3mH and c = 500 f, calculate the (i) duty cycle, (ii) ripple current of inductor, (iii) ripple voltage of filter capacitor, (iv) critical value of capacitor and (v) maximum and minimum values of inductor current.	**K2**	It expects students to interpolate the concept of boost converter under certain condition.
16b.	Analyze the harmonics in multiple and sinusoidal PWM based inverter.	**K2**	It expects students to illustrate the concept of harmonics in power electronic interface.

Knowledge levels	K1	K2	K3
Part A	4	16	-
Part B	52	78	-
Part C	-	30	-
Total Marks	**56**	**124**	-
Percentage	**31.1**	**68.9**	-

Based on such analysis, the extent of marks that can be scored with merely exhibiting lower order skills can be estimated. Here, it is clear that the entire paper can be answered with just acquiring remembering and understanding skills.

This is further illustrated with the second example.

Illustration 2
Audit of a Biotechnology question paper

	BIO-INFORMATICS	Knowledge level (Marks per question)					
Q.NO	**Question**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**
1	What is Local Area Network? Give an example?	2					
2	What are different types of DBMS models?	2					
3	What is shotgun sequencing?	2					
4	Write two important differences between global and local alignment.	2					
5	What is evolutionary distance method?	2					
6	Define Threading.	2					
7	What is DNA computing?	2					
8	What is Sequence-Tagged Site (STS)?	2					
9	What are subroutines in PERL?	2					
10	Name the string operators with examples.	2					
11a	Define Operating system? Explain the architecture and organization of an operating system. (3+10=13)	3	10				
11b	What are biological databases? Explain the different types of biological databases with examples. (3+10=13)	3	10				
12a	Write a detailed account on different methods used for sequence alignment?		13				
12b	What is BLAST? Describe different types of BLAST programs in detail. (3+10=13)	3	10				
13a	What is Phylogram? Explain bootstrapping analysis of phylogenetic tree. Write an account on Molecular clock. (3+5+5=13)	3	10				
13b	What is homology modeling? Explain briefly about the steps involved to model a protein structure using a template structure with suitable example. (3+10=13)	3	10				

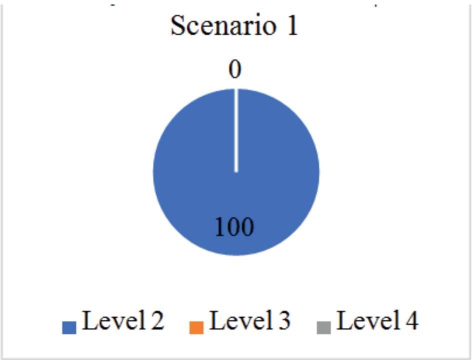
14a	Explain machine learning process with a neat diagram. Write an account on (i) Hidden Markov Models (ii) Support Vector Machines. (5+4+4=13)		13					
14b	What are DNA microarrays? Discuss the biomedical applications of microarrays? (3+10=13)	3	10					
15a	Discuss in detail about regular expression operators in PERL. (13)		13					
15b	Explain control structures in PERL with programs. (13)		13					
16a	Describe the principles of dynamic programming. Draw a dynamic programming using Needleman – Wunsch algorithm for the following sequences. (7+8=15) (i) Sequence 1 : GATCTA (ii) Sequence 2 : GATCA.		15					
16b	Explain in detail about the role of bio-informatics in drug discovery with various approaches. Discuss the relevance of bio-informatics applications in discovery of vaccine candidates for Covid-19 virus. (7 + 8 =15)		15					
	Total Marks	**38**	**142**	**0**				
	Percentage	**21.1**	**78.9**	**0**				

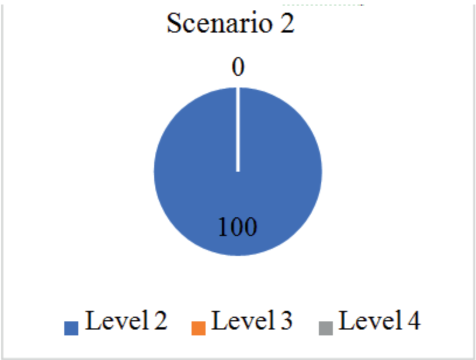
Knowledge levels	Scenario 1	Scenario 2
Level 2	100	100
Level 3		
Level 4		
Total Marks	**100**	**100**

Level 2	UPTO
Understand	
Level 3	Apply
Level 4	Above Apply

Scenario-1 Considering the case if the students choose to answer lower order level in either-or questions where the knowledge level is not matching. Scenario-2 Considering the case if the students choose to answer higher order level in either-or questions where the knowledge level is not matching.

POWER ELECTRONICS	BIOINFORMATICS





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Specific observations and recommendations

Course title	Overall Analysis on the Quality of Question Papers
1.Civil Engineering	❖ The current question paper format does not effectively match the cognitive level in answer choices. ❖ Part C questions can be improved by providing a scenario and split-up of marks. ❖ Open-ended questions such as "write a short note" do not adequately measure student's understanding and should be avoided. ❖ Short problem-solving questions can be effectively measured in part A. ❖ The introduction of assertion-reason type questions in part A will help to measure higher-order thinking skills. ❖ The questions focus on explaining procedures in questions rather than conceptual analysis and applying the procedures.
2. Bio-Technology	❖ Questions are straightforward and simple ❖ Questions like write a short note on, Comment on, define does not reflect the specific expectation on answers ❖ Even though Part C is giving opportunity for evaluate and create level, the questions are grouped to understand level according to AICTE guidelines ❖ The questions did not encourage the students to think creatively or critically. ❖ The usage of RBT words doesn’t reflect the higher order level of the questions.
3. Electrical and Electronics Engineering	❖ Some questions seem to be from unrelated topics and course outcomes. ❖ The either-or, question schoices have varying knowledge levels which creates ❖ possibility for students to omit the higher order level question ❖ The question paper seems to have an overemphasis on lower-order thinking skills, such as Remember and Understand, whereas the course outcomes aim to develop higher-order thinking skills such as Apply and Analyse. ❖ Some key concepts, such as Dual Converter and Traic, appear to be missing from the question paper.

4. Electronics and Communication Engineering	❖ Open choice questions in all sections may lead to a possibility of omitting higher knowledge level questions. ❖ The level of RBT (Revised Bloom's Taxonomy) does not align with the level of CO (Course Outcome). ❖ For problem-solving questions, relevant information should be provided, and the impact of the result must be evaluated. ❖ The cognitive levels should be consistent in all options. ❖ Write short note-type questions should be modified to assess the student's specific knowledge.
5. Mechanical Engineering	❖ Most of the questions do not provide a means to assess the student's proficiency in various knowledge domains. ❖ The questions do not effectively prompt students to engage in critical thinking and higher-order cognitive processes. ❖ Part-A questions mostly focus on the ability to recall information. ❖ Some question papers have more than 50% of questions that test lower knowledge levels.
6. Computer Science and Engineering	❖ Some questions have typographical errors and missing clarity. ❖ The phrasing of the question is not clearer and easier to understand in many portions. ❖ In Some questions missing data and clarity is found. ❖ The possibility of omitting higher order level questions is high. ❖ Misuse of Bloom’s taxonomy action verbs found in questions. [E.g: Question: Develop algorithm. In this case in reality no new algorithm can be developed because the default algorithm is already in use and should be reconsidered, as there may be potential for improvement or adaptation.]
7. Information Technology	❖ Most of the questions do not have the same knowledge level as the choice-based and either-or questions. ❖ Misuse of action verbs like the word "discuss" in framing the question appears to be inappropriate as no topic is expected to be discussed. ❖ The given question lacks sufficient information for designing a website, and the open-ended nature of the question makes it difficult to provide a comprehensive response.

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Summary of Observations on Engineering Question Papers

Based on the analysis, the following observations can be made which are similar to that made in the case of arts and sciences courses.

- By and large, questions tend to focus on straightforward and factual recall or understanding of information, instead of challenging students to think deeply and demonstrate their knowledge across all six levels of Bloom's Taxonomy. They are mostly focused on the Remember and Understand level with few questions related to Apply or Analyze levels.
- Some questions lack in clarity regarding what is expected in the answers from the students.
- Open-ended questions such as "write a short note" do not adequately measure a student's understanding and should be avoided.
- Part C questions can be improved by providing a scenario and split- up of marks.
- Some question papers have higher order questions mixed with lower order questions, which allows students to ignore them easily. For example, the following choice-based question is of two levels.

  a. Describe the classification of errors and error sources. (or)

  b. A satellite station S is 6.5 m from the main station A and the following observations were taken A = 0°0', B = 102°48', C = 256°12', D 324°6'. The length of AB, AC and AD were computed to be 1895 m, 2277 km 2522 m respectively. Determine the direction of AB, AC and AD.
- Some action verbs actually do not intend to test higher order skills as expected. (Eg. Analyze the transmission characteristics associated with dispersion and polarization techniques).

  The question in fact does not require deep analytical skills.
- For problem-solving questions, relevant information should be provided.
- Typographical errors / errors in Tamil translation are noticed.

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Overall Recommendations

- Quality of the Question Papers require large scale improvement.
- Implementation of Outcome Based Education (OBE) should be carried out with proper understanding of the significance of OBE. Regular training and upskilling on OBE and Bloom's Taxonomy should be provided to faculty members to ensure their understanding and effective implementation of OBE.
- Increasing the share of higher order questions may lead to a higher failure rate among students if done immediately. There should be a gradual movement towards increasing the share of marks that can be obtained only through exercise of higher order skills. For example, it can be increased from 10 per cent to 40 per cent over a period of 5 years with clear guidelines to teachers on how to train students to take on questions with higher order skills.
- Questions should be designed in a way that provides equal opportunity to all students to demonstrate their understanding, while also ensuring that better learners can score high marks.
- The final/semester Grade Sheets issued to students should reflect their level of achievement in different knowledge areas.
- The work undertaken by Board of Examiners and Board of Scrutinizers should be continuously monitored and evaluated.
- Universities should include the processes adopted for Question Setting in their Orientation/Refresher/Induction Programs.
- Examiners should be trained to design question papers that align with the specified levels of revised Bloom's Taxonomy to assess the students' knowledge and understanding across all levels of cognitive complexity.
- Evaluation should also include use of case studies and project- based assignments.
- Given the fees charged for examinations across Universities, there is ample scope to invest in improving the quality of examinations through better incentives for paper setters, scrutinisers and academic auditors.

- A periodic audit of both question papers and answer evaluations must be made mandatory. Tamil Nadu State Council for Higher Education (TANSCHE) should ensure the quality and transparency of the audit process.
- While individual universities may be given autonomy over the syllabus design, a common set of competencies (graduate attributes) should be identified for each programme (undergraduate degree) independent of the college or university where the course is offered. TANSCHE can develop the benchmark for competencies or graduate attributes with the aid of a panel of experts in that particular discipline.
- Such competency identification can then be used to generate a set of specific indicators of skill sets (programme outcomes) essential to acquire at the end of a programme. The competences can thus form the basis on which specific course outlines and outcomes can be developed.
- Improving the quality of question papers without ensuring quality of evaluation may not be helpful. Any effort to address the quality of examination therefore has to simultaneously engage with both the setting of question paper as well the quality of evaluation of answer sheets. Again, a transparent audit of evaluation of answer sheets maybe put in place by TANSCHE.
- Academic audit of question papers and evaluation undertaken by autonomous colleges may also be carried out.
- Best practices in evaluation need to be identified, acknowledged and used to incentivise adoption of similar practices in other educational institutions.

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LIST OF ABBREVIATIONS

- AICTE All India Council for Technical Education
- ANJAC Ayya Nadar Janaki Ammal College
- BIT Bannari Amman Institute of Technology
- COs Course Outcomes
- COVID-19 Corona Virus Disease
- GER Gross Enrollment Ratio
- LOCF Learning Outcomes-based Curriculum Framework
- NEP National Education Policy
- OBE Outcome Based Education
- POs Program Outcomes
- QPs Question Papers
- TANSCHE Tamil Nadu State Council For Higher Education
- UGC University Grants Commission

Notes :

Evaluation of Semester-End Question Papers of State Universities in Tamil Nadu

Investments in education at all levels have been one of the core attributes of Tamil Nadu's distinct development trajectory. Tamil Nadu is known for its high levels of enrolment of both boys and girls in higher education.

It is crucial to enhance learning outcomes and foster the development of human capabilities while promoting quality employment opportunities. A significant concern revolves around the perceived inadequacy in the quality of learning outcomes within higher education. Mere updates to curricula and syllabi may prove insufficient in improving student competencies if the efficacy of learning outcomes is compromised by inadequate reforms in the evaluation process.

To bridge this gap, the State Planning Commission conducted an assessment of select question papers across disciplines, including humanities, social sciences, natural sciences, and engineering, sourced from representative universities.

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